CHNOLOGY DEPT.

The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

VOL. LI
No. 1321

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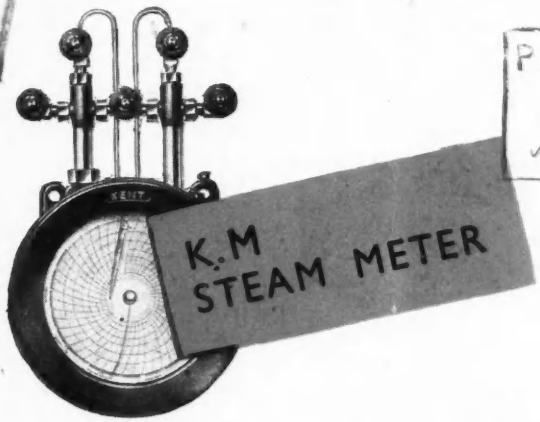

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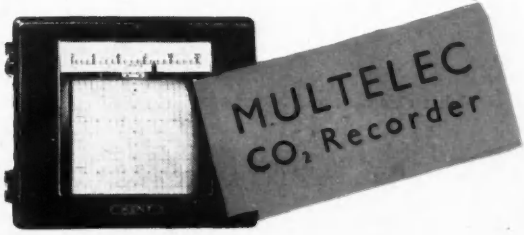

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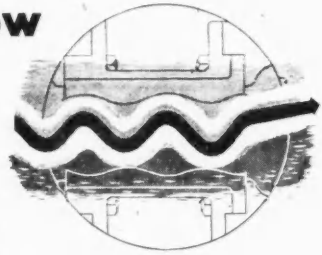

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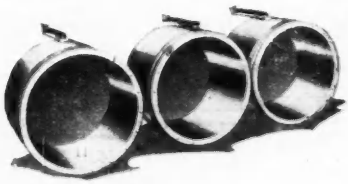

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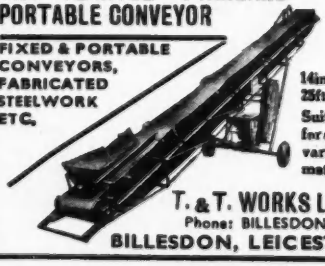

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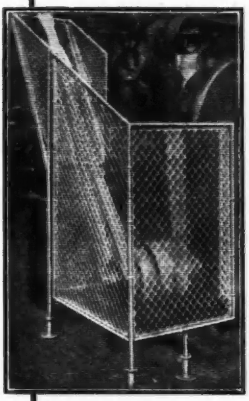

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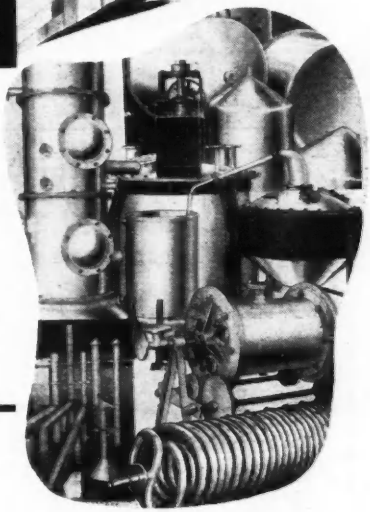

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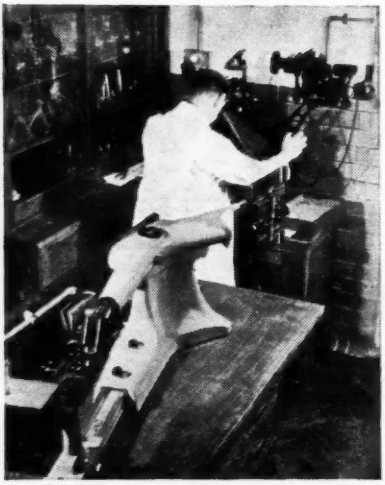

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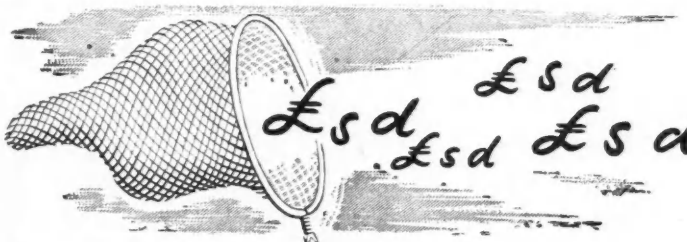

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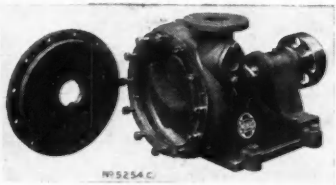

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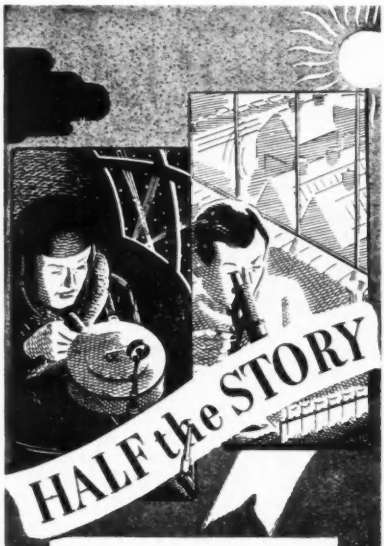

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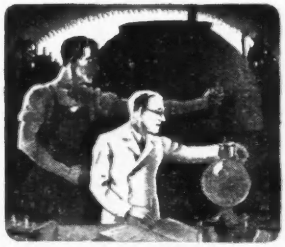

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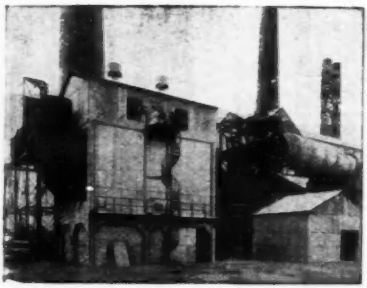

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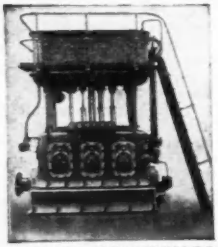

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October 21, 1944

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Diamonds and Diamond Production

MANY a fair jewel born to grace the ballroom or the opera box and to flirt "like a true good woman till we bade adieu," has been caught up in the storm of war and translated into overalls to work at a bench amid engineering lathes or, possibly a worse fate, to labour amid the fume and stench that are so often the consequence of the use of chemicals. The diamond that these "fair jewels" wore has joined its former owners—or would-be owners—in war work. In doing this both kinds of jewels have taken on a new lustre, no doubt, but whereas the human jewel is likely to return undimmed to her setting, the diamond has become caught up in the wheels of industry and will be increasingly put to "useful" purposes. That, at least is the conclusion that we get from reading a paper on the industrial use of diamonds given by Mr. F. G. Rockwell, head of the Diamond Section of the U.S. War Production Board.

The carbonado, or black diamond, is non-cleaveable, opaque, less brittle, and tougher than the crystal variety. This was one of the first of the gem stones to be used industrially, and was applied to the diamond core bit used in mining. Six or eight individual stones were set alternately in the inner and outer periphery of the bit; while satisfactory, the stones were expensive, $100 and more per carat, and often became loosened and lost. In time the cast bit was produced, by which small inexpensive stones were bonded in the metal, producing a cheap but effective tool. The tendency is thus towards the use of the smaller and less expensive stones. The gem, of course, must have a good colour, and its value is dependent upon the manner in which it is cut and polished. The dividing line between gem and industrial diamond is indefinite and if the demand is for industrial diamonds, many that might otherwise become gems are put to industrial use. While we are accustomed to regard the diamond as having a hardness of 10 and carborundum one of 9, a more recent determination (C. M. Woodell, U.S. Electrochemical Society) shows the diamond to have a hardness of 36.4 to 42.4, the hardest synthetic abrasive known being boron carbide (19.7), carborundum retaining its Mohs scale hardness figure of 9.

Diamond dust is used as an abrasive, either free or incorporated into a tool or wheel. The consumption of diamond powder has increased enormously during the war as the result of the demand for quartz

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crystals. Diamond dust is also the cutting constituent in the grinding wheel, this being a bonded material composed of cemented tungsten and tantalum carbides.

There are many other uses for diamond powder which have developed during the war and will be retained afterwards. Industrial stones may be used for drilling, boring and turning, wheel dressing, and dies. Each of these has its particular characteristics. The drilling stones are small well shaped, about 80 to the carat and up to one-third of a carat in size. They are incorporated in the bit which is cast or sintered and, as just explained, has replaced the earlier type of bit for mining. For boring and turning, and for machining non-ferrous metals, shaped stones are selected, lapped and polished to comply with specifications for definite purposes. These stones must have a highly resistant cutting edge and an absolutely smooth surface, and must be cut and polished in accordance with the crystal structure. Natural stones are used without cutting and polishing and are set in holders of various types to be used mainly as wheel dressers. The fine finishings imparted by this agency to present-day cars permit the new car to be driven at 40-50 m.p.h. whereas a few years ago the speed for the first 1000 miles could not be above 20 m.p.h.; this is due to the use of the diamond tool, but whether it is considered an advantage depends on whether one is a motorist or a pedestrian. Finally, diamond dies, through which the fine wire essential for precision instruments is drawn, are made of small, fine stones, with perfectly clear centres, free of flaws.

Mr. Rockwell's opinion is that the use of the diamond in industry will increase for many years to come and consumption will increase proportionately. Nothing approaching the diamond in hardness has ever been discovered and he is doubtful whether any satisfactory substitute ever will be. How long, we may ask, will it really be before mankind produces an industrial diamond synthetically? It would seem that something might be possible in this direction for certain of the uses of the diamond, judging from past experience, but the expense of making even black diamonds has so far outweighed any advantages. Whether the world's supply of diamonds will last as long as the need for them exists we do not know. Since the diamond has been produced in nature, it has been produced by natural agencies. Those natural agencies can be simulated by human means. One day it will be found desirable to employ the much more powerful means now at our disposal to the solution of this problem. Our generation is likely to improve on Moissan's methods. He failed to produce marketable gems, but we now know that it is not only the gem quality that is needed. Dealers in precious stones do not want the market overloaded by the production of artificial gems, but the synthetic production of carbonados is another story.

NOTES AND COMMENTS

Science in India

NO fanfare of trumpets announced the arrival in India of Professor A. V. Hill, yet in the long run his visit may well lead to an improvement in the status of Indians such as no effort on the part of viceroys, rajahs, or merchant princes could compass. Many reasons have conspired to keep India out of the main stream of scientific progress, and the incidence of war has led to an even greater isolation, just at a time when isolation was least to be desired. Professor Hill's scientific embassy, therefore, could hardly have been better timed. As an ambassador of science, he had to get an immense amount of work into a very short period, but the very difficulties he encountered helped him to recognise the corresponding difficulties with which Indian men of science are perennially faced. Happily, he does not consider the difficulties to be insurmountable, provided that they are tackled in the right way. Professor Hill has seen enough of politics during the last five years to enable him to judge its worth as compared with the value of scientific knowledge; and he has not hesitated to say frankly that India has suffered, and is suffering, from a surfeit of politics. If political departments will forgo their petty pride, and pull together in the real interest of the scientific advancement of India, Professor Hill believes that there is a real hope for a prosperous, even a

magnificent future for the country and its people. If, however, politics pure and simple continues to rule the day, it seems that the prospect is dismal indeed. The cardinal fact is that, like a true scientist, Professor Hill has evolved a constructive plan. At present this plan is imaginary, but it is a basis for research in India in connection with national development; it *can* be worked, we are convinced, and if men of good will are ready to set it in action, a prosperous future for India can be assured.

Equipment for Indian Science

THE comprehensive programme arranged for the Indian scientists who are just now on a visit to Britain will provide a unique opportunity for them to gain an insight into the many structural changes which have taken place in this country during the last five years. In collaboration with the D.S.I.R., they will visit various scientific centres and industrial areas such as Cambridge, Manchester, Leeds, Sheffield, Billingham and Scotland, to acquaint themselves more intimately with our progress in chemistry, physics, medicine, technology and agriculture. India's need for scientific equipment in the widest sense is immense, ranging from a simple indicator to a complete power station. While an expenditure of some 50 lakhs of rupees is at present envisaged, potential demand is as much as 3 to 4 crores of rupees. The British producer of equipment, instruments, etc., should thus be placed in a favourable position in the transition and post-war periods. However, a note of warning should be addressed to any enterpreneur who still assumes that he can rely on supplying India with consumers' goods of his own choosing India's need is for capital goods and skilled personnel, and any short-sighted attempts at preventing her inevitable advance on the path of progress would, in the end, have disastrous results.

Development in Drugs

HOPE that the post-war era would be characterised by a great expansion of synthetic drugs in Britain, parallel to the development of dyestuffs in the years following 1918, was expressed by Professor H. Berry, Dean of the College of the Pharmaceutical Society, when he reviewed the work of the past year at the opening of the College's 103rd session. He pointed out that, since the last war, the vast majority of synthetic drugs introduced into medicine had emanated from Germany, just as before that war Germany had been pre-eminent in the dyestuffs field. Speaking of the development of pharmaceutical chemistry, especially in the study of the relation between chemical structure and therapeutic activity and the standardisation and assay of medical subpstances, as well as in the introduction of new synthetic drugs, he stated that firms were finding that pharmacy graduates were of greater use in these fields of research than were those holding a pure chemistry degree. Training in physiology and pharmacology, he said, made a definite contribution in this direction, as the basic facts of those sciences were essential. For the future he advocated further specialisation "on a sound basis," and noted the fact that the University of London was planning for a subdivision in the final year of the B.Pharm. degree course. In view of the speed with which this subject is developing, we suppose such a policy is unavoidable. We hope, however, that Professor Berry's suggested "sound basis" will be really sound, and that budding pharmacists will not specialise so early that they grow out of touch with what is going on around them, and, as so often happens with ultra-specialists, become unable to express themselves in language comprehensible to anyone outside their own small circle.

EQUILIBRIUM DIAGRAMS

The Institute of Metals has just added three more alloy systems (Nos. 2, 3, and 4) to its Annotated Equilibrium Diagram Series. The three systems dealt with are those most requested by members when the series was first announced a year ago, *viz.*: Copper-Tin, Copper-Zinc, and Copper-Aluminium. The diagrams (6d. each, post free) are by G. V. Raynor, M.A., D.Phil., and consist each of six pages (11½ by 8¼ in.) with one figure. Each of the series consists of (*a*) the diagram reproduced on a generous scale and based on what is regarded as the most valuable work in each phase field, (*b*) a table giving all important data connected with the diagram, (*c*) a number of critical notes, and (*d*) a list of references. The first number of the series (Aluminium-Zinc) is still available.

Society of Chemical Industry

Adjourned Annual Meeting—The Messel Lecture

DIVESTED of practically all formal business, the 63rd annual meeting of the Society of Chemical Industry, adjourned from July, was held at the Royal Institution on October 13. A large attendance witnessed a number of interesting ceremonies and heard Professor A. V. Hill's remarkable lecture on "Science in India," following the award of the Messel Medal. A happy coincidence was the presence at the meeting of five of the Indian scientists who are visiting this country on a special mission as the guests of H.M. Government.

To begin with, the retiring chairman of Council, Dr. William Cullen, made the second presentation of the Priestley Gavel to the Royal Society, the first presentation having taken place earlier in the year in the rooms of the Royal Society. Our readers will remember that the gavel was made, with his own hands, by the late president, Mr. Wallace Cohoe, from the wood of a persimmon tree still growing in Priestley's American garden. This beautiful piece of craftsmanship, a token of the brotherly relations existing between British and American men of science, was accepted by Professor Hill on behalf of the Royal Society, of which he is secretary.

Hon. Membership for Dr. Cullen

The next item on the programme was the formal installation of Dr. E. K. Rideal as president of the Society. Having received the chains of office at the hands of Dr. Cullen, Dr. Rideal proceeded with his first duty, which was the investiture of Dr. Cullen with the honorary membership of the Society. By this act, Dr. Cullen joins a select band of 17, only two of whom are resident in the British Isles. Dr. Rideal referred to Dr. Cullen's widespread and varied activities, notably on behalf of chemical education, and laid special stress on his untiring devotion to the affairs of the Society. Dr. Cullen, while gratefully accepting the honour, claimed that the presentation was entirely *ultra vires*. He referred to his activities as general secretary of the Society during the past three years as an enjoyable adventure—he had always been adventurous—and he treasured the memory of his intimate association with the provincial branches and his friendly correspondence with the overseas sections.

In presenting the Messel Medal, Dr. Rideal explained why Professor Hill had been chosen as the recipient. There were three main reasons: first, because he was secretary of the Royal Society—the representative of all scientific societies in this country; secondly, he was one of the world's greatest physiologists. He had, furthermore, specially studied the mechanism of muscles; muscles fed on sugar—a carbohydrate; and it had been stated that the British Empire was founded on carbohydrates! The third reason was one of personal friendship: many years ago, Professor Hill—then Owen Jones Lecturer in Physical Chemistry at Cambridge—had secured, from the somewhat niggardly authorities, a galvanometer; and that galvanometer had been one of Dr. Rideal's most treasured possessions at Cambridge.

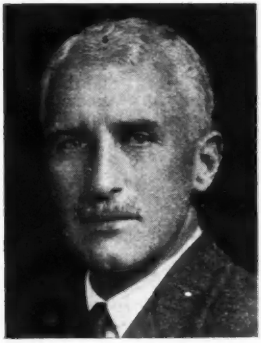
Science in India

Expressing his deep gratitude to the Society of Chemical Industry for the award of the medal, Professor Hill said that he had first heard of the award last March, in the office at Delhi of his friend Sir S. S. Bhatnagar, Director of Scientific and Industrial Research for India. Rudolph Messel, said Professor Hill, would have been deeply interested in the catalytic effect which science is now beginning to have in Indian affairs. Almost alone among the great industrialists of his day he was a regular attendant at scientific gatherings, and maintained close contact and personal friendship with scientific men.

Speaking of his own ungrateful task of being forced by circumstances to give up hope "for the duration" of being a scientist himself, in order to become a general busybody, Professor Hill explained that unfortunately the net effect of trying to introduce science into politics was too often the reverse, namely, the introduction of politics into science. Perhaps homesickness for one's own laboratory makes one rather too ready to see failure where there may, after all, have been some small measure of success. Scientists who try to influence public policy should set no store on the trappings of public honours or importance and should continue to regard scientists as better men than politicians or officials.

I was invited last autumn, Professor Hill continued, by the Government of India to go there and advise about scientific research, particularly in connection with future plans for national development, and with the object of bringing Indian science into closer contact with science elsewhere. I was given very special facilities, during a five months' visit, for seeing all I wanted; I travelled about ten thousand miles there, chiefly by air, and received the warmest possible welcome everywhere, particularly from Indian scientific friends. Everyone seemed to regard my visit both as a gesture of friendship from British science and also

Dr. William Cullen, elected a honorary member of the S.C.I.



Professor A. V. Hill, Messel Medallist and Lecturer for 1944.

Dr. E. K. Rideal, installed last week as President, S.C.I.

as a sign that the Government of India intended to take science more seriously; and the Indian Press, which took a great interest in it, was seldom critical and always benevolent. I mention this to give an idea of the friendliness which exists, not towards a particular Englishman but to a delegate of British science. There is a real interest in science among thoughtful people in India, and a widespread conviction that science and the scientific method, deliberately and resolutely applied to national development, may be the saving of their country. They have seen the example of other countries, and have been particularly impressed by what has happened so quickly in Russia; though they realise that Russian methods are not applicable wholesale in India. They know perfectly well, also, that scientific development, in the present state of Indian resources, is only possible by co-operation; and sensible people want to co-operate—with each other, with us, and with the rest of the world. It is well understood that science, more than any other subject, is international in its scope, method and outlook. If people can collaborate in anything at all, they can surely do so in scientific research; and there is, in fact, very little isolationism among Indian scientists—the swindle has been shown up by world events. Moreover, there is hope that by working together in scientific research, collaboration can gradually be achieved in all the other things that follow research, by which knowledge is applied to men's urgent practical needs for health and comfort.

If, therefore, we in Britain are sincere in wanting to continue our long association with India, an association which, on the whole, has been friendly and profitable to both sides, a very special obligation rests on scientific men to play their part. A close and friendly partnership between the scientists, the doctors, and the engineers of Britain and India might very well succeed in repairing the damage done by treating the problems of India far too long as mainly political ones, instead of chiefly concerned with the betterment of the life of its people.

Most people do not realise yet the magnitude of Indian scientific development in recent years. Continually my Indian scientific friends talked bitterly or sadly about the slowness of their progress, the poverty of their universities and institutions, the lowness of their salaries, the under-staffing of their laboratories, the shortage of proper equipment, and particularly the lack of contact with the outside scientific world. Most of this is true when measured on the absolute scale, and I told them it was a good thing to grumble provided that grumbling did not make them despair: but I begged them to remember that in the last 25 years Indian scientific progress has, in fact, been greater than in the whole of previous history. Measure it how you will, by the number of scientific societies and journals, by the number of scientific graduates (or even of F.R.S.'s), by the number of good laboratories, institutes, and establishments, by the number of industries applying scientific methods, by the contributions which India has begun to make to world science: by all such standards the progress of Indian science is a very real thing. By comparison, of course, with countries in which a start was made much earlier, the absolute progress in the last 25 years has been small: but growth is more properly represented on a logarithmic scale, and plotted in that way the progress of Indian science gives grounds for hope rather than dejection. One has only to attend a meeting of the Indian Science Congress—the opposite number of the British Association—to realise the number and the keenness of Indian scientists;

one has only to visit some of the excellent laboratories or institutes in many parts of India to realise that the possibilities of good scientific work are already there; one has only to attend a meeting of the Board of Scientific and Industrial Research and to see the interest of industrialists in its work to be aware that a determination exists to use the results of scientific discovery for practical ends.

Technical Training

One noticeable weakness at present of Indian students of science and technology is that they are mostly rather inexperienced and inapt in practical things. This is not due to any lack of innate ability that way, for the traditional handicrafts of India require high dexterity, skill and practical artistic sense; it is partly due to the insufficiency of laboratories and equipment for practical training, but largely to the fact that children, particularly in better-class homes, seldom learn to use their hands—by carpentering and other hobbies, by taking alarm clocks and bicycles to bits, and by the thousand practical accomplishments which make so great a difference to proficiency in laboratory or workshop. There is a common idea that the Indian mind tends rather to dialectic than experiment, to literary, legal, or philosophical studies than to practical science or technology. I doubt if this tendency, so far as it exists, is more than an unfortunate accident, due partly to the fact that such studies are cheap and easy, requiring nothing more than lecture-room and books, while practical science and technology are costly in laboratories and equipment. Recent experience in training youths for the technical branches of the Indian Forces has shown astonishingly satisfactory results, and a visit to such places as the Meteorological Observatory at Delhi, or the Tata Steel Works at Jamshedpur, proves that Indian scientists, artificers and operatives can show a high degree of skill, dexterity and workmanship.

The fundamental problems, however, of India are not really physical, chemical, or technological, but a complex of biological ones referring to population, health, nutrition, and agriculture; all acting and reacting with one another. The population is increasing now by about six millions a year, in spite of a mortality which, at every age below 55, is four to eight times ours. Undernutrition is widespread and many millions are living on the verge of starvation, while chronic malnutrition acts and reacts with disease in a vicious circle producing misery and inefficiency.

It is the more regrettable, therefore, that the biological sciences, on the whole, are so weak and that provision for teaching and research in them is generally so deficient. The tendency, at present, in India, is to think of progress and development mainly in terms of industry and its needs, requiring chiefly physics, chemistry, engineering, and metallurgy as their basis. We now know that the future developments of science will lie, not perhaps in the purely biological field, but largely in that where the biological and the physical sciences meet and react with one another. The first of India's scientific needs is to strengthen and expand education and research in the biological sciences, in medicine and its associated subjects, in physiology and biochemistry, in zoology, botany, and genetics, and in all the applications of biology. In emphasising the importance of the biological sciences in India, I would not underestimate the value of physics, chemistry, metallurgy, and engineering; for progressive biology in these days depends very largely on the tools and methods of physical science; and, moreover, large-scale industry based on these has to provide the means and resources, the tools and equipment, the chemicals and the transport, which make a progressive development possible in agriculture and medicine. All I want to urge is that India's fundamental needs are in the biological field and must be so regarded if a true picture is to be formed.

More Surveys Needed

In planning for the development of India, one of the chief requirements will be of more accurate information of what Indian resources actually are: resources of minerals, plants, and animals; of water and water-power; of labour; and of trained ability. For this purpose the Geological, the Zoological, and the Botanical Surveys should be greatly strengthened and improved, and a number of new surveys or assessments instituted. In such work, in order to arrive at reasonably accurate results in a reasonable time, the methods of statistics and of sample surveys will have special value. It is fortunate, therefore, that there are eminent statisticians in India, and that the Indian Statistical Institute is a centre of great interest and activity. At present there is no national register of scientific and technical personnel, comparable with our Central Register here, but the National Institute of Sciences has now started to construct one. There is no doubt of India's capacity to produce scientific men of the highest quality—and as education and facilities for higher study and research improve she will certainly produce them. I said scientific men, but women are beginning to take to science, too, and much depends in India on women playing a greater part in all the affairs of life —including science and medicine.

An article in *Discovery* (August, 1943) by Sir Lewis Fermor, formerly head of the

Geological Survey in India, on "Scientific Work in India," gave an excellent account of Indian scientific societies. It is worth while emphasising the importance of these societies to Indian science, and of the need to give them national scope and authority.

We know very well here how directly the progress of science in Britain has depended on scientific societies, not only for the fellowship they provide between their members, but because they enable us to do jointly what we should certainly fail to do as individuals. In India the importance of scientific societies should be even greater than here, because of the greater tendency for everything to come under the Government; and governments everywhere need to be watched, guided, and criticised by independent agencies and people. In India, however, life is not so easy as here for scientific societies, partly because scientific people on the whole are poor and there are few rich patrons of science, partly because of the enormous distances between different centres, partly because of conflict of interest and outlook between different communities and groups. As regards the first of these—poverty—a subsidy from Government is not a satisfactory substitute for financial autonomy, for it is the very independence of learned societies that gives them their greatest value and strength. An adequate endowment of the learned societies of India could do more for Indian science than any comparable expenditure in other ways. As regards distances, after the war we may look for a wide extension of air travel. Far better than a government subsidy to air lines would be an assured pay load by a gift to learned societies of a very substantial mileage of free air-travel for their members. Nothing could help more in that vast country than liberal provision for scientific people to mix freely, quickly, and in comfort. Such easy mixing would help to get over the third difficulty, that of conflict of interest and outlook between different groups. That difficulty, anyhow, *must* be got over if India is ever to be a nation; scientific men are usually more sensible than others in disregarding sectionalism and prejudice; they can set a good example to the rest.

National Institute of Sciences

Every great country has a national academy of science, treated with more or less honour and housed with more or less dignity in its capital city. One might have expected that in India also a growing interest in nationhood and a growing national pride would have led to the formation of similar institutions there—national academies of science and arts, a national library, a national gallery, a national museum, and so on. Unfortunately, political emotion and sectional strife have dominated public attention, and such essential signs of nationhood have, as yet, been crowded out. There is good hope now that one of these gaps can be filled by the recognition of the National Institute of Sciences of India as the premier scientific body, aiming to do in India what the Royal Society does here. If Indian science is to have the influence which it should on public thought and national policy, it must find means of expressing its corporate opinion to the Government and the world. Lack of such means hitherto of corporate expression is largely responsible for the lack of influence on public policy of which Indian scientists so hotly complain. The cure is in their own hands, if they will combine through their learned societies for joint action.

Industry Must Help

If Indian science is to make the contribution it could to national progress it is imperative that industry should play its full part. Indian industrialists are not unmindful of what science can do for them; they take, for example, a very special interest in the work of the Board of Scientific and Industrial Research. But on the whole they tend rather to expect other people, particularly the Government, to supply the science while they supply the exploitation of it. There are few examples, as yet, of real research done by industrial firms in their own laboratories; and there are very few examples of endowments for research, in universities and elsewhere, provided by Indian industry. The relative lack of understanding of the importance of pure science provides a certain danger, *viz.*, that special value might still be attached, by those who dominate policy, to applied rather than to pure science in universities and research institutions. The Tata organisation has been different from the majority in this respect; it has made huge benefactions to science, pure as well as applied, and the Metallurgical Laboratory at the Tata Steel Works at Jamshedpur is a model of what an industrial research laboratory can be. But if Indian industry as a whole is to progress it must realise that science is not a thing which can be bought over the counter when required, but must be an essential part of the machinery of any great industrial organisation.

In this country, in addition to many research laboratories in individual firms, there are about 25 research associations working co-operatively for industry in connection with the Department of Scientific and Industrial Research. In India the Board of Scientific and Industrial Research has not yet established such joint associations, but a certain number do in fact exist; they are maintained, not by a levy on industry assisted by a grant from Government, but by a cess on the raw product. The labora-

tory at Bombay of the Indian Central Cotton Committee is a good example of this; there are other similar organisations for research on lac and jute, and there may soon be one for sugar. Provision, moreover, has recently been made by the Government for national laboratories to be established under the Board of Scientific and Industrial Research, for research in physics, chemistry, metallurgy, fuel, and glass; to this development the Tata organisation has made a substantial contribution.

Chemical Technology

The laboratories of the B.S.I.R. at Delhi are mainly occupied at present in special chemical problems related either to the use of raw materials (for the manufacture, for example, of plastics) or to the special needs of the war. Some very successful processes have been worked out there, which are now being developed industrially. Recently founded, there is now an excellent Institute of Chemical Technology at Bombay, attached to the University, while the new Ordnance Laboratories at Cawnpore are undertaking important work in a great variety of subjects. Plans are in contemplation for the manufacture of food-yeast on a large scale; there is great need in India of high-class protein and B vitamins, for addition to a diet of low-grade cereals. Chemical industry has made a good start, but I gather that there is still rather little understanding of really large-scale chemical processes. There is a great need, therefore —and the same is true of other industries —to send scientific and technical people abroad for high-class laboratory and works experience. It would certainly be wise for British industry to offer facilities for this purpose. If India is not to have full co-operation with us she will certainly turn to America and—in spite of hard words about "British Imperialists"—she would really rather co-operate with us. Moreover, a sterling balance which by the end of this year will probably be about £1000 million will mean a big demand for British capital goods.

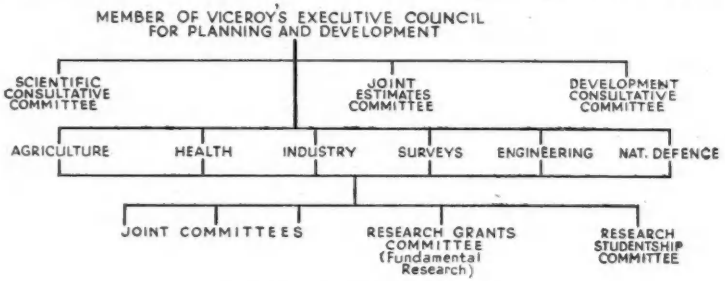
Scientific research financed by the Central Government of India comes under a variety of departments and agencies and badly needs rationalising: and in addition to all this medley there are research organisations of many kinds under the many governments of Provinces and States, and the whole business of co-ordination and interchange is made almost intolerably complex by the variety of different authorities concerned with research and its application. India can reach effective nationhood in the modern world and attain a higher level of prosperity only by working as a functional unit together. It is easier to co-operate in scientific research than in most things, because facts are more, and emotions and prejudices are less, involved. It will be a pretty tough job getting India to function together rationally as a whole; but something must be done in India if she is ever to make full use of science to become a great and prosperous country.

A Plan for Research

Before I end, let me give you the outline of a plan—an imaginary plan at present—for research in India in connection with national development. No doubt all kinds of difficulties will be found, all kinds of reasons discovered why changes should not be made—but we are well used to that here. Under the Member for Planning and Development, a system of six Research Boards would be set up, as in the accompanying diagram. Each board would have, as chairman, not a minister or politician, but an eminent scientist or professional man, of the kind we appoint here as chairman of one of our research councils under the Lord President. Members of the boards would be scientific or practical men in their respective fields and there would be a certain number of members representing the development interests to be referred to later on. The work of the six boards would be co-ordinated by common membership. In each subject there would be a Director of Research, who would be a scientific man of good standing. He would be secretary and principal executive officer of his own board and a member of each of the other boards. He would be responsible for directing, organising, initiating, and co-ordinating research on a nation-wide scale in his field. Each board would have a number of committees dealing with various aspects of its work and joint committees would be set up between boards. Each board would allocate grants in its own field, for specific researches to be carried out in any institution in India. A Research Grants Committee would be established jointly between the different boards, to award grants to laboratories throughout India, and a Research Studentships Committee appointed to consider applications for research studentships, particularly by young workers of proved ability desiring to gain further experience by research abroad. Each Director of Research would prepare estimates for his board which, after discussion and approval, would be submitted to the Member for Planning and Development. A Joint Estimates Committee, under the chairmanship of the Minister, would compare and co-ordinate the different estimates before submission to the Finance Department. After estimates had been approved, each board would be able freely to spend the funds at its disposal without further application or interference. To advise the Member for Planning and Development on general scientific policy, and on special

matters submitted to it, a Scientific Consultative Committee would be appointed consisting of the six directors of research and of six distinguished scientists, one in each field.

In addition to all this, it would be well to set up, in the "user" departments, and guided, but at the lower "executive" level. India can learn from our mistake and recognise that science in these days must be, not just a handmaiden but an equal partner in statecraft. If she does, there are good hopes of a happy and prosperous future; if she does not, but puts her trust



A Plan for Research in India.

Development or Improvement Councils to apply the results of research directly to the various practical problems affected by it. Joint *ex officio* membership, either way, of an Improvement Council and its corresponding Research Board (or boards) would ensure, on the one hand, that the results of research were fully known to those who had to apply it, and, on the other, that those who had to do the research were kept amply aware of the practical needs. In order to ensure that development as well as research was well looked after and co-ordinated at a high level, it would probably be wise to set up, under the Member for Planning and Development, a Development Consultative Council. This Council would not interfere with the executive responsibility of departments to deal with their separate projects of development; it would ensure that attention was kept focussed on those various projects, and that they were welded together into a consistent and well-balanced plan.

To Indian scientific men, well brought up in the pessimistic faith that nothing whatever will really get done, such a plan would seem too good to be true. But a new spirit is abroad in India and people should realise that it will be much easier now to rationalise scientific research under Government auspices, than it will later on. Each year's delay will give existing interests longer to dig in, to find better and better reasons why drastic change should not be made. There is a great opportunity now in India for scientific statesmanship at the highest level of policy, for using the best scientific guidance available. One of our mistakes in England has been to employ our ablest scientific men, not, so to speak, at the "ministerial" level, where policy is formed in political magic, I see little but inefficiency and misery ahead.

At the close of the lecture, Dr. S. K. Mitra, by permission of the president, presented Professor Hill with the honorary membership of the Indian Science Congress, one of the rarest of Indian scientific distinctions. He explained that there had not been time to prepare the scroll of membership during Professor Hill's sojourn in India and he hoped members of the Society of Chemical Industry would not think this an inauspicious occasion for the gift.

Sir S. S. Bhatnagar's Speech

Sir Shanti S. Bhatnagar—himself an honorary member of the Society of Chemical Industry—proposed a vote of thanks to Professor Hill. He explained that he had been quite sure that Professor Hill had visited India as a scientist, not as a politician (despite the suspicions of certain persons), because, on his arrival at Delhi airport, no viceregal car had been sent to meet him! Instead, it had been considered sufficient by the authorities that he should be received by a mere scientist (in this case Sir Shanti himself). He pointed out that previous attempts by scientific men, for example, Simonsen and Hollins, had been put into "cold storage" by the Government of India. Hill's plans, however, had proved acceptable to the Government—if not *in toto*, at least in part. Sir Shanti gave the welcome news that the Department of Planning and Development had been brought into being, though as yet all the other departments were not being very co-operative. After the vote of thanks had been seconded by Dr. L. A. Jordan, and received with general acclamation, the meeting adjourned to tea.

LETTER TO THE EDITOR

The Status of the Chemist

SIR,—The points raised in your last issue by "External Graduate" are hardy annuals, but are only a few of the many things of which chemists are continually complaining. Dr. Miall has given one of his inimitable editorials in *Chemistry and Industry* (October 7) to the position of chemists with regard to selection as directors or managers, but I feel most strongly that chemists have got to face up to the fact that they are and must be the first people to attempt to remedy the situation. It is useless for chemists to complain that they are badly treated unless they deal faithfully with the question "Why are they so treated?"

I am sorry for External Graduate if he feels that his external degree goes against him, but from what he writes he appears to have held several appointments. I cannot for the life of me see why he has eternally to inform prospective employers that his degree is an external one. Few employers are concerned with how a man obtained a degree; they are primarily thinking about what the man himself is like, what he knows, and how he will mix with other members of the staff. It is an unfortunate fact that many employers attempt to take advantage of a man who has obtained a degree by evening study, if he remains in their employ, and it is to be regretted that the Government is one of the worst offenders in this respect, but I know several ex-evening students who are holding down big jobs.

The main point is that the chemist has got to develop a wider outlook and to be more a man of the world in his dealings with his fellow-men, and he has got to be more of a craftsman at his job. He has to learn how to handle other men socially and in business and he has to appreciate that, whether a chemist is employed at the bench or in an administrative capacity, he still remains primarily a chemist. So, frequently, a man will admit that he started life as a chemist, but that he is now on the administrative side, and only too often the bench chemist will speak contemptuously of his colleague, who was a chemist, but who has gone into administration. The chemist must learn to regard the whole works as a laboratory and to realise that while it may not necessarily be fatal for a non-chemist to assist in the management of certain non-chemical processes, it would be fatal for such people to work in the more specialised part of the laboratory, except in a very junior capacity.

To produce such an outlook demands, I think, a fundamental change in the method of training chemists. Their education must be less specialised than it is in the early days and it must be longer if sufficient theory is to be absorbed, but above all it must be more practical. This practical training should approximate much more closely to that of the engineer and should include two or three periods of two or three months in a chemical works or an outside chemical laboratory. In the works itself the chemist must endeavour to persuade his employers that he is interested not only in analysing chemicals or devising products, but that he is primarily concerned with their commercial *raison d'être*, with the marketing of the products; what the public thinks of them; how improvements can be effected in the product itself, its method of presentation to the public, its keeping and wearing qualities; and with the reduction of the cost of production. When the chemist has convinced his employers about these points he will be well on the way to becoming a manager or a director.

Above all, chemists have got to learn that they must all hang together or surely they will all hang separately. While employers are organising and while trade unions are organising, the chemist still thinks it gentlemanly to plead isolationism. Not even the present war has taught him anything in this respect. How many chemists even belong to any chemical society at all, let alone one that can look after their material interests?

I fully agree with External Graduate in one respect. If chemistry is to become better organised and more representative, I think it is essential to introduce more young blood to our councils. The difficulty is that the chemist is not politically-minded and that chemists do not know each other sufficiently well. Professors and senior lecturers obtain votes because they are well known to their students, who tout for their support, but it is difficult to get to know younger men, if these are not the *protégés* of their professors. It is absolutely necessary, in my opinion, to introduce some more democratic method of election to the councils of the various chemical societies, but again there is the difficulty of selecting a suitable method, which does not consist of the outgoing council nominating the incoming one and which does not, on the other hand, allow candidates to be elected as the result of stunt propaganda. Neither of these methods gives true representation nor does it lead us anywhere.

Yours faithfully,

THOMAS MCLACHLAN.

Mainly as a result of the expansion in the manufacture of explosives, ammunition and military pyrotechnics in Canada, the gross value of products manufactured by establishments included in the miscellaneous chemical products industry rose to $251,666,000 for 1942, as compared with $100,422,000 in 1941, reports the Dominion Bureau of Statistics. The capital employed in the industry was increased to $250,666,000 in 1942 from $162,561,000 in 1941.

Methylamines

Their Manufacture and Uses

METHLYAMINE compounds have, since their industrial use was discovered a few years ago, become important in several industries among which are textiles, rubber, leather, insecticides and disinfectants, and explosives. Their manufacture and uses are the subject of an article by Dr. E. H. Riddle, of the Röhm & Haas Co. (*Chem. Ind.*, 56, 2, 209), a summary of which appears below.

The impetus for the commercial manufacture of methylamines resulted from the important discovery in 1927 by McLaughlin and his associates in the Tanners' Council Research Laboratory in Cincinnati that they had a powerful accelerating effect upon the unhairing of skins. The Röhm & Haas Company started research on methylamines in 1929, and by 1931 the laboratory work on the methylamines appeared sufficiently promising to warrant the construction of a pilot plant. On the basis of information obtained in this unit, a full-scale plant was designed and placed in operation in 1934

Catalytic Dehydration

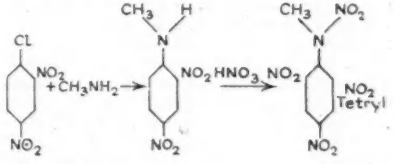
The procedure developed for the manufacture of the methylamines involves the catalytic dehydration of methanol and ammonia. In this process, anhydrous methanol and ammonia are vaporised, mixed in the desired proportion (the exact ratio depending upon the ratio of mono- and dicompounds to be produced), preheated and passed over a dehydrating catalyst. The reaction is carried out in a multitubular converter, using molten salt for temperature control. The ammonia and methanol first form monomethylamine, which then resets further with additional methanol to produce di- and trimethylamine. This series of reactions is exothermic and the heat evolved must be dissipated as the reaction proceeds over the catalyst.

The product from the converter contains a mixture of the three methylamines with ammonia and water. Since the methylamines are gases at atmospheric temperature and pressure and have very close boiling points (a spread of only 12.5°C.), the separation of this mixture presented one of the most difficult problems in the development, a problem further complicated by the fact that trimethylamine forms a constant boiling mixture with ammonia, mono- and dimethylamine. The problem of seperation was finally solved by the use of a combination of selective absorption in water and fractionation under pressure.

In addition to varying the ratio of methanol and ammonia in order to attain the desired ratio of methylamines, it is customary to recycle monomethylamine when a high ratio of di- to monomethylamine is required. In this way the proportion of trimethylamine, for which no substantial outlets have been developed, is not appreciably increased. The trimethylamine that is formed may be burned for fuel or may be reverted to mono- and dimethylamine by passing over a catalyst with ammonia and steam.

All equipment in the methylamine plant is constructed of iron, and automatic controls are used to maintain the required temperatures and pressures throughout the entire system of converters, columns and stills. The analysis of the relatively pure trimethylamine removed from the water scrubber is carried out automatically by passing a sample of the gas into water and determining the electrical conductivity with a calibrated recording instrument.

The methylamine derivative making the most significant contribution to the war effort is tetryl, correctly named 2,4,6-trinitrophenylmethyl nitramine, but more often referred to as tetranitromethyl aniline. It was first described in the chemical literature in 1879, and has been traditionally manufactured by nitration of dimethylaniline, a reaction in which one of the *N*-ethyl groups is replaced with a nitro group. However, in 1938 a French journal reported a new method of manufacture based on the reaction between monomethylamine and 2,4-dinitrochlorobenzene, an important intermediate in the dyestuffs industry. In 1941 this "French" method using monomethylamine was adopted by U.S. plants, making tetryl for British contracts and for Lend-Lease.



Tetryl is more powerful an explosive and is more heat-stable than TNT or picric acid; on the other hand, it is considerably more sensitive to mechanical shock. For this reason, it is the favourite explosive for use in boosters.

The discovery by Oenslager, of the Diamond Rubber Company, in 1906, that aniline accelerates the vulcanisation of crude rubber, is now considered as important a milestone in the history of rubber as Good-

year's discovery of vulcanisation itself in 1839. Oenslager's discovery was followed by extensive research to find new and better organic accelerators, and we now have five major chemical types: aldehydeamines, guanidines, thiazoles, dithiocarbamates, and thiuram sulphides. Important representatives of the last two classes are manufactured commercially from dimethylamine through its reaction with carbon disulphide in the presence of alkali:

$$(CH_3)_2NH + CS_2 + NaOH \rightarrow (CH_3)_2NCS_2Na + H_2O$$

Treatment of this product, sodium dimethyldithiocarbamate, with zinc chloride converts it to the corresponding zinc salt $(CH_3)_2NCS_2)_2Zn$. Oxidation of the dithiocarbamate by a variety of methods results in formation of a thiuram disulphide, tetramethylthiuram disulphide.

$$2\ (CH_3)_2NCS_2Na \rightarrow (CH_3)_2NCS-S.S-SCN(CH_3)_2.$$

Further treatment of this disulphide with either sodium cyanide or cyanogen chloride removes one sulphur atom to give the monosulphide $(CH_3)_2NCS-S-SCN(CH_3)_2$. All these dimethylamine derivatives are successfully used with synthetic and natural rubber when a fast permanent cure is required.

An important type of methylamine derivative in the industrial field is the high-molecular-weight quaternary ammonium halide. Investigations on the surface active properties of these amine salts were carried out by Dr. I. C. Somerville in the Röhm & Haas Research Laboratory shortly before the beginning of the methylamine development. As an outcome of this research, Triton K-60, a long-chain alkyl benzyl dimethylammonium chloride was introduced for use as a softening and finishing agent for textiles. This type of product is manufactured by reaction of the corresponding higher alkyl dimethylamine with benzyl chlorides:

$$\text{Alkyl}-N(CH_3)_2 + C_6H_5CH_2Cl \rightarrow \left[\text{Alkyl}-\overset{+}{N}(CH_3)_2-CH_2C_6H_5\right]Cl^-$$

The alkyl dimethylamine may be produced by reaction of dimethylamine with an alkyl amine or alcohol, the choice depending upon price, availability and comparative yields. Cation-active materials of this kind have an affinity for cellulose, which results in a permanent action, and they are recommended as lubricants for fabrics where extreme softness without oiliness is desired.

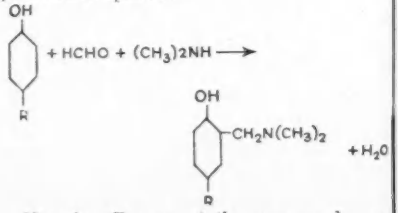
Reports of the germicidal and bactericidal properties of these long-chain alkyl benzyl dimethylammonium salts first came from Domagk in 1935, and at present there is considerable interest in the quaternary type of compound among manufacturers of germicides, antiseptics and related products. Accordingly, a large number of variously substituted quaternary ammonium chlorides were prepared under the direction of Dr. H. A. Bruson, of the Röhm & Haas laboratories, and were evaluated in the laboratory of Parke, Davis & Company. The most potent compound in this investigation has the name *para*-di-isobutylphenoxyethoxyethyl benzyl diethylammonium chloride and is manufactured by a series of reactions from petroleum and coal-tar derivatives. The final steps involve reaction of dimethylamine with a chloride to form a tertiary amine, from which the quaternary ammonium chloride is obtained by reaction with benzyl chloride:

$$C_8H_{17}C_6H_4OCH_2CH_2OCH_2CH_2Cl + (CH_3)_2NH \rightarrow C_8H_{17}C_6H_4OCH_2CH_2OCH_2CH_2N(CH_3)_2$$

$$C_6H_5CH_2Cl \downarrow + (C_8H_{17}C_6H_4OCH_2CH_2OCH_2CH_2N(CH_3)_2) \rightarrow (C_8H_{17}C_6H_4OCH_2CH_2OCH_2CH_2N(CH_3)_2CH_2C_6H_5)Cl^-$$

This compound, sold under the trade-name Hyamine 1622, is characterised by high bactericidal activity, relatively low toxicity, absence of any appreciable odour, and stability on prolonged storage. Practically the entire output is going to the U.S. Navy for use as a disinfectant and germicide.

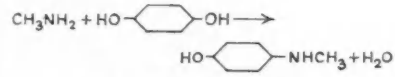
Investigations have revealed that tertiary amines may be obtained by reaction of dimethylamine and formaldehyde with a phenolic compound:



Hyamine B, one of the compounds pro-

duced by this type of reaction, is sold for use as an anti-rust, anti-corrosion and neutralising agent in the preparation of Army Ordnance preservative engine oil, used to protect engines and engine parts during shipment or during the periods before or after a general overhauling.

One of the most universally used organic reducing agents for photographic developers is commonly known as Metol or Elon and is produced by reaction of monomethylamine with hydroquinone, itself a component of most developing formulæ:



Amide Plasticisers

A recent development of the Resinous Products & Development Company is the field of amide plasticisers, exemplified by Plasticiser 35. This product is a dimethylamide of a synthetic fatty acid which is similar to stearic acid in its general properties. However, Plasticiser 35 is appreciably superior to the corresponding dimethyl stearamide. It is a particularly effective plasticiser for polyvinyl butyral, combining efficient plasticising action, excellent permanence at high temperatures, and low cost. Newer developments, such as Plasticiser 36, are indicative of the results of continuing research in this field.

The use of dimethylamine (supplied in the form of the sulphate salt) as an accelerator for unhairing with lime has steadily expanded since its introduction. Compared with other types of accelerators such as sulphides, dimethylamine sulphate has a very mild action on the hair, and is therefore particularly suitable for use when the tanner wishes to save the hair. In addition, the cleanliness and relatively lower swelling of the hides is of value in the production of an exceptionally fine-grained leather.

Examples of additional industrial outlets include the use of monomethylamine in manufacturing certain vat dyes and in the production of a variety of pharmaceutical products, such as theobromine. Many other reactions are in the first stage at present and it is expected that they will reach industrial maturity in the post-war years.

The Canadian Engineering Standards Association, founded in 1919, has announced the widening of its activities to co-ordinate the standardisation of materials and processes of all kinds. Under amended letters patent, it will be known henceforth as the Canadian Standards Association, and will be able to play a full part in the proposed United Nations Standards Co-ordinating Committee.

Personal Notes

MAJOR-GENERAL SIR NEILL MALCOLM has resigned from the chairmanship of British Benzol & Coal Distillation, Ltd., as from December 31, 1944.

At the annual general meeting of Catalin, Ltd., MR. H. W. HEALY, M.I.E.E., M.I.Mech.E., general manager; MR. F. RIESENFELD, Ph.D., technical manager; and MR. K. R. L. SLADEN, A.C.A., secretary, were elected directors of the company.

MR. J. L. CARLYLE and MR. C. J GRAYSTON have, after many years of service and experience with George Scott & Son (London), Ltd., and Ernest Scott & Co., Ltd., now become directors. These companies are associated with the old-established firm of Henry Balfour & Co., Ltd., of Leven, Fife, the managing director of which company assumes the managing directorship of the two Scott companies.

Obituary

MR. F. A. TYE, works manager of the Rotherhithe Wharf of Honeywill & Stein, Ltd., died on October 6, aged 59, after almost 40 years' service with the company.

PENICILLIN STANDARD

An attempt to establish a world standard for penicillin is being made by leading scientists from many countries at a meeting, which opened on October 16. The meeting was convened by the League of Nations Health Organisation, and is accommodated in the rooms of the Royal Society, Burlington House, with Sir Henry Dale, president of the society, in the chair. The delegates are: Australia—Major J. L. Bazeley (Commonwealth Serum Laboratories); Canada—Dr. G. D. W. Cameron (Chief Laboratory of Hygiene, Department of Pensions and National Health); France—Dr. J. Trefouël (Director of the Pasteur Institute); United Kingdom—Dr. C. R. Harington (National Institute of Medical Research) and Dr. J. W. Trevan (Wellcome Physiological Research Laboratories); United States—Dr. R. D. Coghill (Northern Regional Research Laboratory, Peoria, Illinois), Dr. R. P. Herwick (Chief of the Drug Division of the Food and Drug Administration), and Dr. M. V. Veldee (Chief, Division of Biologics Control, United States Public Health Service). Other countries which are sending observers include India and South Africa.

The sulphuric acid plant at Sagua la Grande, Cuba, began production on a commercial basis recently.

Penicillin is to be made in Peru, where the construction of a plant, with an output sufficient to cover domestic needs, is planned.

SAFETY FIRST

Personal Safety in Handling Chemicals

by JOHN CREEVEY

IN the chemical industry it is by no means infrequent that men suffer the ill-effects of chemicals for the simple reason that they are not using the proper safety protection which is available, or because they are using it incorrectly. There is protective clothing as a whole or in part, goggles, gloves, boots, leggings, face masks, respirators, oxygen breathing apparatus, and safety belts—to mention a few items. Indeed, some form of personal protection has been evolved against every common hazard which can be regarded as personal and arising from direct contact with chemicals or the vapour of them. In particular circumstances, the law enforces provision of safety equipment by the employer and its use by the employee, and steps are taken to see that the law receives recognition and is followed as wisely as can be.

In spite of this, however, an accident arising from mere thoughtlessness on the part of a suitably protected worker cannot always be avoided; for instance, a man lifting his face mask in a hazardous atmosphere and suffering the consequences. In this the most that can be done is to provide equipment of recognised pattern, keep it in efficient condition by frequent inspection and overhauling, see that it is used in all cases where that is desirable, and not only instruct workers as to its use (and precautions involved for obtaining full value as regards protection), but also train the worker individually to realise that he himself must avoid all negligence and thoughtlessness and co-operate. Simultaneously, those responsible for safety in chemical and allied works must also fully understand that both the provision and the wearing of certain forms of personal protection against the hazards of chemicals, as in the case of a garment or a mask, cannot dispense with the necessity for reducing to a minimum the risk arising from dust, fumes, or splashes of liquid. Reliance for personal protection must never be placed entirely upon the provision and use of safety equipment.

Comfort and Convenience

Protective clothing must give adequate protection against the hazards to which the wearer will be exposed, bearing in mind that some protection is always better than none: this applies irrespective of whether there is a complete garment or it is merely a question of gloves or gauntlets, or boots with leggings. Each garment, even a mere apron, should be so light in weight as not to impair its protective efficiency or its durability under working conditions: it must also be comfortable for the wearer, with weight carried in the easiest manner by that part of the body which is best able to give support; in addition, there must be nothing to interfere with the wearer's freedom of movement. Even a pair of rubber gauntlets can prove to be tiring to wear if they are badly proportioned as regards weight and fit; for instance, when the weight is unduly greater than actually needed for hard service, they become tiring to the wearer, and a badly-fitting glove results in clumsiness in the movement of the hands and arms, and leads also to insecure handling of various objects. The makers of safety gloves and gauntlets have paid attention to these factors, and they can be relied upon to give good service to the user, with advice in all that appertains to selecting the right type and the best fitting, but it is, nevertheless, essential for those who buy to know that just any old glove or gauntlet will not do.

A Survey of Dangers

In order to provide all the safety equipment required, it is necessary to make detailed check-up of all hazards, in the works as a whole, and for individual plant and processes. Furthermore, there must also be a continuous review of processes, and of the adaptation of each worker to the hazards of his work. In the case of new employees, there must be some attempt to determine, as far as possible, the susceptibility of the individual to chemical hazards in general, and to those of the work in which it is intended to employ him in particular. This must be done most conscientiously, if an entire absence of accidents is to be the result. Just how far it may be truly desirable to follow such a course, must be left to the commonsense of the works' administration. Proper personal safety for employees, apart from just meeting the enforcements of the law, is necessary if their full confidence is to be obtained.

Although many articles of protective clothing are made of rubber or from a rubber mixture, it may be found that the development of a new process will demand changes in the type of material normally considered to afford protection. In the case of the manufacture of fuming sulphuric acid, for instance, it has been found that woollen clothing gives better protection than any other, and that rubber has limited application, for when rubber gloves are immersed in the fuming acid they will not remain good

for more than two or three minutes. Yet, the degree of protection which is afforded can often be improved, though a material which proves particularly serviceable to meet certain needs may ultimately be found to have drawbacks, if considered from another angle of possible hazard. This has actually been so in connection with non-inflammable clothing, where the inorganic salts used to give fire-resisting qualities may make the treated clothing particularly conductive to electric current, which may be a hazard of its own in the process where it was hoped to use this clothing.

Industrial Safety Gleanings

Some Official Publications — Dust Explosions

A REVISED edition of the Ministry of Labour's memorandum on *Safety Measures Required in the Use of Acetylene Gas and in Oxy-Acetylene Processes in Factories* has just been published (H.M.S.O.; 2d.). Circumstances in which acetylene explosions are possible are outlined, and the danger of acetylene-air mixtures ranging from 2 per cent. to 82 per cent. acetylene is noted; also the risk of unduly high pressures even in absence of air. Acetylene may be manufactured and kept only when the pressure to which it is subjected does not exceed 22 lb./sq. in., and then only under approved conditions. At present, approval is being given only in respect of booster plant used in connection with low-pressure generators.

Generator and valve types are considered, and the necessity for good maintenance stressed. The importance of correct design of hydraulic valves is insisted on; these should not be made by inexperienced persons and should be tested every morning.

A list of precautions to be observed in carbide stores and acetylene generating plant is included, as well as regulations that should be observed with oxy-acetylene welding.

* * *

Another useful Stationery Office publication is the Home Office leaflet (price 1d.) detailing the conditions under which explosives may be conveyed by road in petrol-driven or oil-driven vehicles. A feature that may not always have been fully observed is that, whereas with oil-driven vehicles, "an efficient chemical fire extinguisher" must be carried, with petrol-driven vehicles it is further specified that such an extinguisher must be "capable of dealing with a petroleum spirit fire."

* * *

The Ministry of Home Security has followed suit by issuing a leaflet outlining methods of reducing fire risk in fibre building boards in war-time building. A common method of building nowadays is the use of rigid sheet materials, such as corrugated steel or asbestos cement, on a rigid framework of timber or steel. Corrugated sheeting is a poor heat insulator and such buildings are, therefore, often lined with insulating fibre board or other building board. All such combustible linings present some degree of fire risk, but the leaflet is concerned mainly with the risk, and methods of meeting the risk, in wood fibre board, which has a high degree of inflammability. Various precautions against the spread of fire, such as the use of flame-retardant paint or the introduction of fire breaks, are described. There is also discussion of the possible alternatives to fibre-board, with tables showing their relative inflammability and thermal value as insulators. Copies of the leaflet may be obtained from the Ministry of Home Security, Publications Branch, Horseferry House, Thorney Street, London, S.W.1.

* * *

Some notes on the risks involved in dealing with hydrofluoric acid are noted in an article in *Ind. Eng. Chem. (Anal. Ed.), 16*, 8, 433. We reproduce a brief extract here as a reminder, in view of the increasing industrial importance of this acid. Liquid anhydrous hydrofluoric acid attacks glass and most organic substances. It will react immediately with the skin on contact, causing serious burns, and its fumes are irritating to the eyes and the mucous membrane. Care should be taken to avoid contact with the liquid acid and its fumes, and workers should wear proper rubber-coated coat or apron, synthetic rubber gloves, and face shields. Hoods with adequate ventilation are indicated for working with this acid in the laboratory; otherwise proper respirators should be worn. Water supply should be readily available for thorough and prolonged flushing in case of accidental contact with the skin. Steel, Monel, copper, silver, and platinum are resistant to the acid, and may be used in the construction of equipment for handling it. Cast iron, or other metals containing silicon, should not be used.

The Division of Industrial Hygiene of the American National Institute of Health, has issued, in consultation with medical and technical personnel of acid manufacturers, recommendations for the treatment of hydrofluoric acid burns.

* * *

Dust explosions in the rubber industry

form the subject of an article by D. F. Twiss and W. McCowan in the *India-Rubber Journal* (September 9, 1944, p. 292). They point out that even to-day the extent of the range of materials providing a potential fire hazard in the rubber industry is not always appreciated. Still less is the fact realised that all combustible materials if intimately mixed with air are capable of giving rise to " dust explosions," General prevention of unnecessary dustiness in operations is an important precautionary measure in any factory.

The following materials (in addition to being capable of giving rise to fires) may be the basis for dust explosions :—Rubber crumb, ebonite dust, practically all accelerator and antioxidant powders, sulphur, zinc stearate, aluminium stearate. This list is not to be regarded as complete. The various forms of amorphous carbon, such as gas blacks and lamp blacks, are not above suspicion, but, possibly because they burn by glowing rather than by producing a flame, they give less danger of dust explosions. As is well known, however, from experience in coal mines, coal dust has been the cause of disastrous explosions.

A simple and convenient form of apparatus for testing the " explosive possibilities " of different powders is described in the article, and a final reminder is given to the effect that an initially local explosion (of any kind), which in itself might be mild and insignificant, can disturb accumulations of settled dust over a large area and provide the nucleus for a large explosion with possibly disastrous effects.

Silicones

Synthetic Resins with High-Heat Stability

ALTHOUGH it has been known for some time that silicones—heat-stable resins with silicon oxide incorporated into the molecular structure of the organic foundation—were being produced in America, on a semi-commercial scale, by the Dow Corning Corporation of Midland (Michigan), it is only recently that security has permitted the release of more detailed information. Some facts are included in the August issue of *Chem. and Met. Eng.* (p. 109, 135).

Research on the silicones, started many years ago by Dr. E. C. Sullivan, research director at Corning Glass Works, was supplemented by a research fellowship at the Mellon Institute; and subsequently the assistance of the Dow Chemical Company was called upon for the production of the various materials required for development of the new product, research at their end being carried on by Dr. E. C. Britton, director of the Dow research laboratory. In February, 1943, the Dow Corning Corporation was organised to undertake the manufacture of silicones.

Details of the method for manufacturing silicone resins have not yet been disclosed, but it is probable that the general procedure follows the synthesis investigated a number of years ago by Russian scientists. Principal raw materials are silicon tetrachloride, magnesium halide, and any one of a number of aromatic halides, such as chlorobenzene. These are reacted by the Grignard mechanism to yield monosilane chlorides of types $RSiCl_3$, R_2SiCl_2 and R_3SiCl. These are decomposed by hydrolysis to give either silanols, silanediols or silanetriols, according to the proportion of silicon tetrachloride used and on the condition in the Grignard reaction. Typical silanetriols are $C_6H_5Si(OH)_3$, $C_6H_5CH_2Si(OH)_3$, and $C_{10}H_7Si(OH)_3$. The silanetriols when heated lose water to give their anhydrides, known as siloxanes, and these polymerise under a variety of conditions to give a wide range of silicone resins.

Many different types of silicones are now being made commercially. They include twelve viscosity grades of fluid for use as low as −56°C., and eight viscosity grades for use from −40°C. and 200°C. These fluids are non-volatile, and have flash-points higher than 320°C. They are not miscible with alcohol, glycol, or lubricating oil, but will blend readily with most of the common solvents, including light naphthas. Five grades for high-temperature lubrication are also available.

Resins for high-temperature electrical insulation include four impregnating varnishes, used for varnishing laminated glass or asbestos cloth to produce non carbonising board. A thermosetting resin, which will not liquefy or soften even at 93°C., was specially developed for impregnating rotating equipment which operates at very high temperatures.

Greases for special purposes include one used in bearings that must function at very low temperature, another for use at temperatures up to 260°C., and a third for oxygen equipment, stop-cock and plug-cock grease for use in the chemical process industries. This is useful in plug cocks which must operate at elevated temperatures or in corrosives. It has the consistency of vaseline at normal temperatures, and will not harden or melt over a temperature range extending from −40°C. to over 260°C. The vapour pressure is so low as to be negligible up to 200°C. This grease does not corrode metals and has no deteriorating effect on rubber or plastics.

Parliamentary Topics

Penicillin

IN the House of Commons last week, Mr. A. Edwards asked the Minister of Supply whether he could make a comprehensive statement on the development of the penicillin position during the last three months; whether the erection of a large plant at a cost of £1,250,000 had been authorised; which company had received the contract for the project; and when production would begin. A similar question was also asked by Mr. Salt.

The Minister of Supply: As regards plants in this country, I would refer to my statement on October 4 (*see* THE CHEMICAL AGE, October 14). The volume of penicillin production both in North America and in this country has substantially increased during the past three months. Total supplies amply cover Service needs and increasing quantities will become available for civilian use. A large-scale plant now being erected in this country will be managed by the Distillers Company as agents for the Ministry of Supply and will commence production in the spring of next year.

Mr. A. Edwards asked whether the Minister could explain why it was necessary for the hon. Member for Grantham (Mr. Kendall) to be left to supply all civilian needs in this country. There were cases of people dying who could not get it until the hon. Member in question came to their aid.

Sir A. Duncan replied that civilian supplies would become increasingly obtainable and inquiries should be addressed to the Ministry of Health.

Dr. Haden Guest called attention to the fact that the Ministry of Health had made penicillin available, when required, in a large number of cases, and that a circular to that effect had been issued to all medical men in the country.

In reply to a question by Mr. A. Edwards as to whether penicillin was now being produced in India, Mr. Amery stated that penicillin was at present produced in India only on a laboratory scale. The possibility of its manufacture in India was being investigated, but some time must elapse before production could begin. No difficulty was anticipated in meeting from elsewhere all military requirements.

Fertilisers

Major Studholme who asked the Minister of Agriculture whether he was now in a position to make any statement as to the results of experiments his Department had been making to determine the advantage of using a mixture of superphosphate and serpentine in place of ordinary superphosphate under conditions pertaining in this country.

The Joint Parliamentary Secretary, Mr. T. Williams, replied that field experiments to test a mixture of superphosphate and serpentine were conducted under the direction of the Rothamsted Experimental Station. So far, the results of the experiments had shown that there was no advantage in using this mixture in place of ordinary superphosphate, but further experiments would be made.

Lieut.-Col. Acland-Troyte referred to a serious shortage of basic slag in the counties of Devon and Cornwall; and asked whether the Minister of Agriculture would take steps to improve the supplies.

Mr. T. Williams said that the supply of basic slag in Devon and Cornwall was insufficient to meet the full demand, but arrangements had been made for additional consignments. In the meantime, alternative forms of phosphate were available for autumn-sown crops.

Rumania's Oil

Captain Gammans asked the Secretary of State for Foreign Affairs whether any representatives of British oil companies in Rumania had yet returned to that country; and, if not, under whose auspices these oil and refinery companies were being operated.

Mr. Law: No representatives of British oil companies have yet returned to Rumania. So far as I am aware, the oil and refinery companies are at present being operated under the existing Rumanian administration, in co-operation with the Allied Control Commission.

Jamaica (Bauxite)

Mr. Riley asked the Secretary of State for the Colonies: What is the law in Jamaica regarding mineral rights; does the freehold owner of land possess a right to ownership of undisclosed minerals; what is the position with regard to bauxite; and was any action being taken regarding the production of bauxite in Jamaica?

Colonel Stanley replied that, mineral rights in Jamaica, except over precious metals and oil, belonged to the owners of the surface soil. As Jamaica bauxite was not required for the war effort, no action was taken by the Government for its production. He was in consultation with the Governor on long-term policy.

Mr. Riley, in a supplementary question, asked whether American companies were being established in Jamaica to exploit bauxite.

Colonel Stanley's reply was that buyers of private land showing possibilities of bauxite were warned by the Government that, as part of the long-term policy, restrictive legislation might be introduced and might be retrospective in effect.

British Industry (Rehabilitation)

Mr. Higgs asked the Chancellor of the Exchequer when he proposed to introduce

the legislation, recently promised, dealing with various matters relating to the rehabilitation of British industry. Sir J. Anderson (in a written reply) said: I am not yet in a position to say when the necessary legislation will be introduced. The detailed working out of the proposals is in hand and consultations on the subject are taking place with representatives of industry and the accountancy profession.

Silicosis

Mrs. Tate asked the Minister of Fuel and Power whether he had any information about the discoveries that have been made at McGill University, Montreal, concerning the prevention and cure of silicosis.

Major Lloyd George replied that he was aware of the experiments which were going on in Canada on the treatment of silicosis by the inhalation of aluminium powder, which were probably what his hon. friend had in mind. These experiments are being closely watched, both by his department and by the Medical Research Council, but he was advised that the results are not yet sufficiently conclusive to justify the adoption of this method of treatment at British mines. The Minister added that contacts had been established with McGill University and that, in view of the report published recently in South Wales, he was satisfied that every possible research was being made.

General News——From Week to Week

The Ministry of Food announces that the only change in the existing prices of refined oils and imported edible animal fats allocated to primary wholesalers and large trade users, during the eight-week period ending December 9, is: South American Premier Jus, increased by £11 per ton to £73 15s. per ton, c.i.f. duty paid, in hardwood barrels or tierces.

At the thirteenth annual general meeting of the British Colour Council certain proposals for the reorganisation of the Council were accepted, involving the formation of six divisions of the Council, three devoted to women's, men's and children's wear, respectively, one for interior decoration, another for transport, and a sixth for colour printing, other than that of textiles. Each division is to elect its own committee.

Wholesale prices in September maintained a steady rise, according to the Board of Trade monthly table. Taking 100 as the yearly average for 1930, the coal index rose from 223.5 in August to 224.0, iron and steel from 184.5 to 185.7, and chemicals and oils from 151.1 to 151.4. The principal alteration occurring during the month among chemical products was a rise of 1½ per cent. in coal-tar products, as a result of increases for toluol and naphthalene.

A revision of the Labelling of Food Order, 1944 (S.R. & O. 1944, No. 738), which, as issued, requires that labels of food colourings pre-packed for sale as such shall disclose the identity of the colouring ingredients with which they are made, now makes it sufficient to disclose the ingredient as "colour" without further specification as to composition except that where the colouring is of synthetic origin the word "colour" must be qualified by either "synthetic" or "artificial."

Candidates are reminded that application forms—returnable by December 1—and particulars of the associate-membership examination of the Institution of Chemical Engineers may now be obtained from the hon. registrar of the Institution at 56 Victoria Street, London, S.W.1.

Foreign News

A new munitions plant, owned by the Cia. Nacional Forjagem de Aço Brasileiro, with a capital of Cr$12,000,000, was inaugurated by the Brazilian Minister of War recently.

Canada's production of asbestos amounted to 427,141 tons last year, compared with 439,459 tons in 1941 and 346,805 tons in 1940.

The Germans stole eight grammes of radium, worth 160,000,000 francs (£900,000 pre-war), from the Curie Foundation, reports the Paris newspaper *France Libre*. Paris has now only six grammes of radium.

Balik-Papan, on the east coast of Borneo, one of the largest fuel oil stores in the Pacific, with a capacity of over 3,000,000 barrels, has been attacked on several recent occasions by U.S. Liberators.

Viscous solutions of alkaline silicates have been used as lubricants for oxygen compressors in Germany, according to a 1944 report of the I. G. Farbenindustrie A.G. Since these solutions are inorganic, there is no danger of fire.

The Brazilian Executive Committee of Manioc Products is constructing three plants for the manufacture of alcohol from manioc with a capacity of 1,800,000 litres per annum. The total cost of this work will be about Cr$20,000,000 and the equipment will be supplied by domestic national manufacture.

Production of aniline dyes has been started in Chile, using both national and imported raw materials, the Instituto Medico-Tecnico Sanitas co-operating in these efforts.

The Chilean Chamber of Deputies has approved a proposal to allow the import of cement duty-free, as home production is insufficient to supply the needs of the Government's public works plans.

Canada's annual requirements of insecticides are roughly 2000 tons of lead arsenate, 1800 tons of calcium arsenate, 600 tons of Paris green, and 75 tons of nicotine sulphate, while pyrethrum and rotenone imports total some 150 tons.

By a new process developed by a U.S. firm, spring-grade beryllium-copper wire is being silver-coated. This is said to reduce wear on wire coiling tools, increase surface electrical conductivity, and reduce surface attack during heat treating and hardening.

The Southern Research Institute has been organised in Birmingham, U.S.A., to discover and develop new products from raw materials in Alabama and adjacent states and to conduct scientific research for existing establishments.

Research awards totalling more than $250,000 to various universities and colleges for scientific investigations of the chemistry of sugar and its rôle in the diet were recently announced by the director of the Sugar Research Foundation of U.S.A., which is sponsored by the leading members of the beet and cane sugar industry.

The possibility of further discoveries of radio-active minerals in the Yukon and North-Western Territories is suggested by the recent action of the Canadian Government in passing Orders-in-Council reserving to the Crown the right to all radio-active minerals found in these districts in lands covered by entry or lease grants.

Corning Glass Works of South America, a recently formed subsidiary of Corning Glass Works, Corning, N. Y., has aquired an interest in Cristalerias Rigolleau, a long-established South American glass manufacturing company which will produce a number of Corning's products now exported to Argentina. Lawrence King, formerly factory superintendent for the St. Gobain Co., France, has been appointed managing director.

Altos Hornos de Bilbao, Spain's leading metallurgical concern, which supplies 60 per cent. of the country's iron and steel requirements, reports that, in 1943, steel output was increased, while that of iron declined. In spite of an increase in coal output in mines controlled by this concern, supplies of coal, as well as those of scrap metal, were insufficient. Production of sulphates is to start in the course of next year. The dividend remains unchanged at 7 per cent.

Allocation control over beryllium, except beryllium copper, has been removed by the United States War Production Board. Supplies are imported from India, Brazil, Argentine and Australia.

Sphagnum moss has been shown, by I. R. Hooper (Ph.D. Thesis, University of Illinois, 1944, Pt. iii), to contain an acidic volatile substance which inhibits bacterial growth in the undissociated form. It can be effectively extracted by aqueous alkali, but its properties are such as to render it valueless as a practical antiseptic.

The President of the Brazilian Republic has approved a recommendation that the National Confederation of Industries should study the possibilities of, and put forward proposals for, establishing a titanium white industry. Last year, while Brazil possesses the necessary raw material for manufacturing titanium white, imports amounted to Cr$13,507,000 in 1943.

In Canada, Government entomologists are investigating the value of DDT, particularly as an agricultural insecticide, and for the control of forest pests. Furthermore, several chemical companies are studying the possibility of manufacturing DDT in Canada, and although one organisation, at least, has designed a plant and selected a tentative site, as yet the Dominion is entirely dependent upon imports of DDT from the U.S.A.

A Bill has been introduced in Washington to extend financial assistance to domestic mining and mineral industry during the transitional and post-war periods. It authorises the Reconstruction Finance Corporation to make loans for the purpose of: (1) making accessible, examining or developing mine workings; (2) mining, milling or smelting ores; and (3) development and rehabilitation of mining operations suspended or curtailed by Government restrictions during the war.

Potteries are being built near kaolin deposits in Uganda, as part of the plan of the Uganda Industrial Commission to encourage minor industries. Sand from the Entebbe district of Uganda has been found to be suitable for the manufacture of good quality glass, but commercial production has not yet started. The East African Industrial Research Board is negotiating the import of glass-making machinery from Britain.

Production of chemicals in Turkey will include a wider variety of finished products. It is now reported that a new plant at Smyrna making caustic soda and chlorine is nearing completion. Equipment for this plant was imported from Germany in 1939, but its installation was delayed owing to the war. It is further reported that plans are being made to establish production of chrome chemicals for the domestic tanning industry.

In Uganda the Government has been urged to work the extensive Bugishu rock phosphate deposits either through a managing agency or by a public utility company with the Government holding the controlling interest.

South African magnesite is now important as a cheaper substitute for imported earths in the regeneration of used lubricating oil, a process developed by the South African Fuel Research Institute. Other applications include the manufacture of refractory bricks, carbon dioxide, Epsom salts, and cupels. Considerable reserves occur in the Barberton district.

Investigations have been made in Venezuela by the Swedish Match Co. with a view to establishing a match factory. An appropriation of $25,000 was made for the purpose and the Swedish company sent a technician to Venezuela. It is stated that a supply of suitable wood has been found and that a company may be formed with a capital of 3,000,000 bolivars, one-half of which would be furnished by Venezuelans. Valencia is regarded as the possible site for the plant.

The new mechanised nitrate plant of the Tarapaca and Antofagasta Nitrate Co., under construction at Tarapaca, Chile, is expected to be in production soon. The enterprise is being financed entirely by the company, and involves an investment of about 350,000,000 pesos. Except for the final process, in which the new plant will produce crystallised instead of granulated nitrate, the same system will be used as in the Antofagasta plants. The company will erect warehouses at Iquique with a storage capacity of 80,000 tons of nitrate.

A $100,000 unit for the manufacture of salts of selenium and tellurium, and to provide expanded facilities for research and development projects, is being constructed by Canadian Copper Refiners, Ltd., Montreal, an organisation which has been producing several grades of selenium and tellurium since 1934, and more recently began the manufacture of selenium dioxide. The production of a wide range of these metallic salts is now being envisaged. Practically the entire output of the new unit will be exported, primarily to the U.S.A. and Great Britain.

New Zealand imports from Canada of chemical products for the year 1943 show a substantial increase over the following year. Imports of calcium carbide amounted to £41,641 (£13,624), those of cream of tartar substitutes to £72,986 (£28,570), salt to £7142 (£3652), antiseptics to £11,806 (£3992) and medical preparations to £8254 (£3601). For the first time, N.Z. imported Canadian cod liver oil, valued at £21,876 and vitamins and vitamin concentrates worth £3121. On the other hand, imports of sulphate of ammonia declined from £24,624 to £22,760, and those of acetic acid from £7836 to £6155.

According to official statistics of the Union Department of Mines, the value of chemicals purchased by the South African mining industry in 1943 aggregated £11,120,848, out of which £548,436 were imports; the corresponding figures for explosives were £2,510,351 and £1538.

Reagents for use in the treatment of ores by the flotation process, composed wholly or principally of the sodium salt of dioctyl sulphosuccinic acid may be imported freely into Australia. The same applies to petroleum, used in the production of blended oil employed as a medium for absorbing naphthalene from coal gas.

Forthcoming Events

The annual general meeting of the Associates and Students section of the **North of England Institute of Mining and Mechanical Engineering** will be held on **October 21,** at 2.30 p.m., in Newcastle-upon-Tyne.

The annual general meeting of the **British Rheologists' Club** will be held on **October 21,** at 2.30 p.m., at the University, Reading. Papers on "The Measurement of Tack" will be read by Dr N. A. de Bruyne and Dr. R. F. Bowles.

The Leeds area section of the **Royal Institute of Chemistry** holds a joint meeting with Leeds University Chemical Society on **October 24,** in the Chemistry Lecture Theatre, Leeds University. At 5 p.m. the film "Pasteur" will be shown, and at 6.30 p.m., Prof. J. W. Cook, F.R.S., will lecture on "Some Chemical Aspects of Cancer Research."

The Food Group of the **Society of Chemical Industry** meets on **October 25, at** 3 p.m., in Burlington House, when Mr. W. B. Adam and Mr. D. Dickinson will read a paper on "Diagnostic Methods in Problems Concerned with the Corrosion of Cans."

A meeting of the Dublin branch of the **Royal Institute of Chemistry** will take place on **October 25,** at 7.30 p.m., in the University College, Upper Merrion Street, Dublin. Mr. H. G. E. Leonard and Mr. P. Whelon will lecture on "Spectrographic Analysis."

The Midland section of the **Institute of Fuel** meets on **October 25,** at the James Watt Memorial Institute, Birmingham at 2.30 p.m., to hear a précis, followed by a discussion, on "Superheaters for Water Tube Coal Resources," by Mr. W. J. Skilling and Dr. M. McGregor.

The Plastics Group of the **Society of Chemical Industry** meets on **October 25,** at 5.30 p.m., in the rooms of the Institution of Electrical Engineers, Savoy Place, W.C.2, when a paper entitled: "The Development of Polythene as a High Frequency Dielectric" will be read by Prof. Willis Jackson and Mr. J. S. A. Forsyth.

The annual general meeting of the Glasgow and West of Scotland section of the **Royal Institute of Chemistry** will be held in the Ca d'Oro Restaurant, Union Street, Glasgow, on **October 27,** at 7.30 p.m.

The Council of the **Institution of Chemical Engineers** announces that the fifth Hinchley Memorial lecture will be given by Sir Alexander Gibb, O.B.E., C.B. (Past-President), on **October 27,** at 3 p.m., at the Institution of Civil Engineers, Great George Street, S.W.1, the subject being "Hydro-Electric Development in Great Britain and its Influence on Chemical and Allied Industries."

The **Association of Austrian Engineers, Chemists and Scientific Workers in Great Britain** meets on **October 29, at** 11.30 a.m., at the Austrian Centre, 63 Eton Avenue, N.W.3, when Dr. F. Berzel, Director of Research, Roche Products, Ltd., will deliver a paper on "Life Saving and Life Preserving Plant Products."

The inaugural meeting of the **Royal Society of Arts** will take place, on **November 1,** at 1.45 p.m., when Dr. E. F. Armstrong, president of the Society, will deliver an address entitled "Chemistry in the Service of Man."

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

ASSOCIATED SCIENTIFIC DEVELOPMENT, LTD., London, S.W. (M., 21/10/44.) September 22, debenture to Lloyds Bank, Ltd., securing all moneys due or to become due to the Bank; general charge.

DAVEY, PAXMAN & CO., LTD., Colchester, engravers. (M., 21/10/44.) September 21, £340 mortgage and further charge, to Colchester Permanent Benefit Building Society; charged on 71 and 72 Hythe Hill, 1, 2 and 3 Foundry Yard, 15 to 23 St. Leonard's Road, and 9 Stanwell Terrace, Colchester. *£54,080. August 17, 1944.

Satisfaction

W. A. MITCHELL & SMITH, LTD., Mitcham, chemical manufacturers. Satisfaction October 3, £2500, registered July 13, 1938.

Company News

Timothy Whites and Taylors, Ltd., declared an interim dividend of 7½ per cent. for the year ended December 31 last (same).

Zinc Corporation, Ltd., reports, for the year ended December 31, a trading profit of £325,801 (£318,427). Net profit is £103,716 (£104,540) and £58,932 (£58,051) is carried forward. The ordinary dividend is maintained at 30 per cent.

Erinoid, Ltd., manufacturers of plastics, are asking for power to issue additional capital as and when the need arises and the regulations permit. An extraordinary meeting, at Winchester House E.C.2, on November 2, at noon, is to consider resolutions to increase the capital from £330,000 to £750,000 by the creation of 420,000 new shares of £1. The present capital consists of £55,000 redeemable 6 per cent. cumulative preference stock and of £275,000 ordinary stock. Since the outbreak of war several projects have been developed and brought into as full a measure of trading activity as war conditions permitted.

New Companies Registered

Kemet Products, Ltd. (390,179).—Private company. Capital: £75,000 in 75,000 shares of £1 each. To investigate and develop metallurgical, electro-metallurgical, chemical and electro-chemical products and compounds; manufacturers of and dealers in metals and alloys, etc. Subscribers: Sir G. S. Pott, K.B., N. Croom Johnson. Solicitors: Holmes, Son & Pott, E.C.2.

Chemical and Allied Stocks and Shares

STOCK markets have been slightly more active, British Funds again tending to move higher and industrial shares showing some good features, although gains on balance were mostly small, while aircraft shares strengthened and home rails again improved. Imperial Chemical were firm at 38s. 6d., Lever & Unilever 44s. 3d. on the full results, Borax Consolidated deferred 35s. 9d., and Dunlop Rubber firm at 46s. 3d. Murex held their rally to 95s., and elsewhere, Triplex Glass 10s. ordinary improved up to 45s. 3d. on the higher dividend. Turner & Newall were steady at 79s. 6d. Babcock & Wilcox strengthened to 50s. pending the interim dividend, with British Aluminium steady at 47s., and British Oxygen 86s. 9d. Neepsend rose to 32s. 6d. on the results.

United Steel at 24s. 9d., Dorman Long at 26s. 9d., and Stewarts & Lloyds at 54s. 7½d. also improving slightly. Tube Investments showed firmness at 96s. awaiting the dividend statement.

Among shares of companies connected with plastics, De La Rue were 191s. 3d., and British Industrial Plastics 2s. shares 7s. 1½d., while Erinoid 5s. ordinary kept steady at 11s. xd. on the results and the maintained 10 per cent. dividend. The proposed increase in capital of the last-named company created a good impression in the market as indicating the scope for future expansion, although it is realised that no immediate issue is contemplated. Cement shares were easier, having been unsettled by the unexpected reduction in the interim dividend of Tunnel Cement. Shares of the last-named company were 49s. 7½d., and Associated Cement 64s., but elsewhere, British Plaster Board rose to 39s. 3d., and Radiation ordinary were firmer at 59s. 6d. Among textiles, movements were small on balance, Bleachers being 12s., Bradford Dyers 23s. 4½d., and Calico Printers 16s. 3d. British Celanese at 28s. 9d. lost part of an earlier rise, and Courtaulds were 55s.

Elsewhere, B. Laporte kept steady at 82s., the interim dividend being imminent. W. J. Bush were again quoted at 63s. 9d., and Burt Boulton at 24s. 6d., while Cellon 5s. ordinary changed hands at slightly over 25s. British Drug Houses were 27s., Monsanto Chemicals 6½ per cent. preference 23s., and Greeff-Chemicals 5s. ordinary 8s. Morgan Crucible first preference kept at 27s. Lewis Berger were 104s.; the results are due in a few weeks and the market is looking for maintenance of the total distribution at 19 per cent., which in respect of the previous year was a very conservative payment. International Paint were 115s. and Goodlass Wall 10s. ordinary became firmer at 18s. 10½d.

In other directions, the units of the Distillers Co. have been firm at 105s., reflecting wider recognition of the very diversified interests of the group, which have been further increased during the war period. United Molasses moved higher at 37s. 6d.; no change is generally expected in the interim dividend, the assumption being that any question of an increase is likely to be left until the final payment for the year. Nairn & Greenwich were 72s. 6d. and Barry & Staines strengthened to 52s. 6d. Wall Paper Manufacturers deferred units were 42s., Metal Box ordinary 90s. 7½d., Birmid Industries 80s., and Bennis Combustion 5s. ordinary 9s. 6d. Report of the last-named company states that notwithstanding less favourable results for the past year, prospects continue satisfactory; as previously announced, the dividend is again 10 per cent. Boots Drug have been steady around 55s., while Timothy Whites firmed up to 40s. xd., and Sangers to 28s. 6d. Amalgamated Metal were 18s. 9d. and General Refractories 17s. 1½d. Oil shares have been less active, with small price movements, "Shell" being 81s. 3d., Anglo-Iranian 117s. 6d. xd., Ultramar 81s. 3d., and Burmah Oil 86s. 10½d.

British Chemical Prices

Market Reports

FIRM price conditions continue to be in evidence in nearly all sections of the London general chemicals market and the movement as regards contract deliveries to the consuming industries is fully maintained. The supply position shows no material alteration and spot offers of the majority of materials find a ready outlet. In the soda products market the demand for solid caustic soda has been fully maintained, and there is also a steady call for supplies of bicarbonate of soda, soda ash, Glauber salt, and salt cake. Bichromate of soda is a good market and a moderate inquiry is reported for the hyposulphites of soda. Quotations for yellow prussiate of soda are on a strong basis and supplies are finding a ready outlet. Strong price conditions are maintained throughout the potash section, and home makers of permanganate indicate a steady demand. Offers of bichromate and yellow prussiate are being fully absorbed and a steady trade continues in acid phosphate of potash. In the coal-tar products section fair stocks of pitch continue to be held and the demand from home users has been on steady lines. A steady trade is passing in crude tar while both the light and heavy grades of creosote oil are being steadily absorbed. A moderate inquiry has been made for carbolic acid and also for cresylic acid. Among the light distillates, the toluols and benzols are going into consumption to the full extent of the quantities available, and a fair trade is reported in the xylols and naphthas.

MANCHESTER.—A certain amount of replacement buying has been reported on the Manchester chemical market during the past week, but sellers state that the volume has been no more than moderate. Other inquiries that have been in the market have not so far resulted in actual business. In the meantime, there has been no noticeable contraction in the rate at which most industrial users are specifying for deliveries against existing commitments, and a fair movement of supplies of the soda chemicals, as well as of the magnesia and ammonia compounds, is reported. In the market for tar products the demand, especially for creosote oil and for toluol and benzol, keeps steady.

GLASGOW.—In the Scottish heavy chemical trade business in the home market has remained very steady. Export inquiries, however, are rather restricted. Prices keep very firm, with no actual changes to report.

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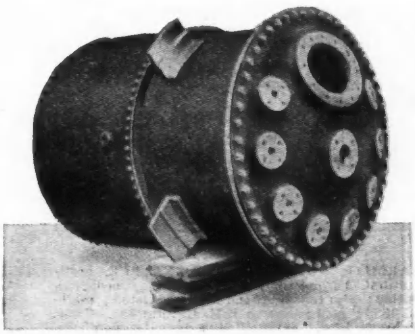

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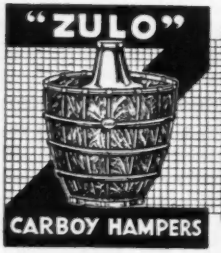

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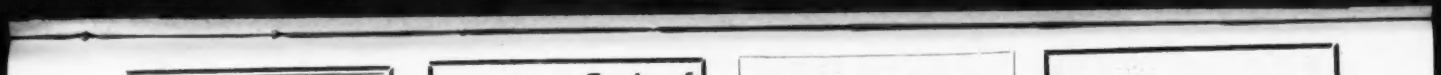

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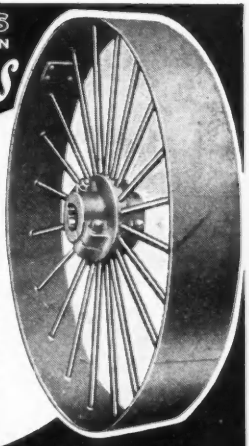

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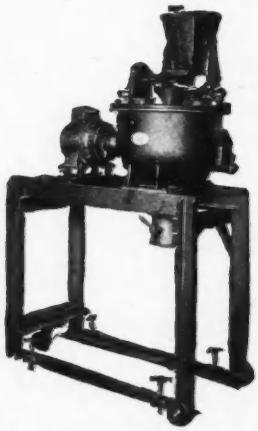

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